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Arrows of times, non-integer operators, self-similar structures, zeta functions and Riemann hypothesis: A synthetic categorical approach

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Abstract

© 2017 L & H Scientific Publishing, LLC. The authors have previously reported the existence of a morphism be- tween the Riemann zeta function and the "Cole and Cole" canonical transfer functions observed in dielectric relaxation, electrochemistry, mechanics and electromagnetism. The link with self-similar struc- tures has been addressed for a long time and likewise the discovered of the incompleteness which may be attached to any dynamics con- trolled by non-integer derivative operators. Furthermore it was al- ready shown that the Riemann Hypothesis can be associated with a transition of an order parameter given by the geometric phase attached to the fractional operators. The aim of this note is to show that all these properties have a generic basis in category theory. The highlighting of the incompleteness of non-integer operators considered as critical by some authors is relevant, but the use of the morphism with zeta function reduces the operational impact of this issue with- out limited its epistemological consequences.

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Keywords

Fractal geometry, Non integer operators, Riemann hypothesis, Zeta function

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